Resource Action: EWG-56 **Task Force Recommendation Category:** 1

POTENTIAL WATERFOWL BROOD POND CONSTRUCTION ON THE THERMALITO AFTERBAY

Date of Field Evaluation: February 2002 to present

Field Evaluation Team: Dave Bogener, Curtis Anderson,

Proposed PM&E:
This PM&E involves construction of four additional brood ponds within the Thermalito Afterbay.

Background:
Since construction about 900 acres of wetland margin have developed around the Afterbay margin. Waterfowl are attracted to this habitat and substantial waterfowl nesting and brooding (primarily mallard) can occur along the wetland margin and in associated upland habitats.

Physical topography of the Thermalito Afterbay is such than even relatively minor lowering of the water surface elevation can result in extensive areas of exposed open mudflats along the northern and eastern edges. These mudflats contain little of no cover. Further, as drawdown continues the distance from open water to cover increases. Under these exposed conditions waterfowl broods are subject to high predation rates.

The Department of Water Resources, California Department of Fish and Game, California Waterfowl Association, and other stakeholders have worked cooperatively over the last 15 years to increase waterfowl production on the Afterbay. One cooperative program to address the reduced cover associated with Afterbay operations involved construction of waterfowl brood ponds. These ponds are constructed by creating a small earthen dam across an inlet of the Afterbay. These impoundments maintain a relatively stable water surface elevation which allows the establishment of emergent vegetation as well as submerged aquatic habitat. Further, these impoundments would create conditions where the open water and terrestrial cover habitats are immediately adjacent. These brood ponds can significantly reduced waterfowl brood mortality.

During September 1991, the California Department of Water Resources (DWR), the California Department of Fish and Game (DFG), the California Waterfowl Association (CWA) and other stakeholders evaluated approximately 22 potential brood pond locations within the Thermalito Afterbay. Evaluation criteria included:

- Site not near high human use areas
- Dam crest elevation of 133.0 feet

- As low as possible earthwork quantities
- Availability of construction materials and access to the site
- Normal Afterbay surface elevation of 130 to 131 feet
- Potential of expected use for nesting waterfowl

Twelve potential brood pond locations including C1, C3, E1, F2, F3, I1, J1, J2, K1, L1, L2, and L3 were eliminated from further evaluation based on the evaluation criteria. Proximity to high public use areas was the most frequently used exclusion criteria. Six waterfowl brood ponds were subsequently created (Figure 1) as a cooperative effort including 1A, A2, 4, J3, B1 and C2. Four additional brood ponds were identified as meeting all the selection criteria including A1, G1, F4, and F1 (Figure 2).

Potential Environmental Benefits:
Although the waterfowl brood ponds were constructed to reduce brooding waterfowl losses and increase production, they provide improved habitat conditions for a variety of terrestrial and aquatic species including special status species. A few of the special status species which have been observed on or near these brood ponds include bald eagle, osprey, black tern, American bittern, American white pelican, white-faced ibis, black-crowned night heron, double-crested cormorant, long-billed curlew, and short-eared owl. Further, these ponds also provide potentially suitable habitat for giant garter snake and red-legged frog.

Conditions in the Proposed PM&E Implementation Area:
This PM&E will substantially alter conditions in four inlets of the Thermalito Afterbay. Creation of the brood ponds will provide a more stable site for establishment of emergent vegetation, aquatic vegetation, and improved moisture regimes for adjacent upland habitats. Outside of the waterfowl breeding season the existing waterfowl brood ponds provide recreational use in the form of warm water fishing, hunting, swimming, and dog trials.

Design Considerations and Evaluations:
- Site not near high human use areas
- Dam crest elevation of 133.0 feet
- As low as possible earthwork quantities
- Availability of construction materials and access to the site
- Normal Afterbay surface elevation of 130 to 131 feet
- Potential of expected use for nesting waterfowl
- Incorporation of a head-gate release structure
- Avoidance of sensitive habitats

Recommendations:
The feasibility of implementation of this PM&E should be evaluated by both the Environmental and Operations Work Groups to determine the merit of further investigation and development.

Resource Action: EWG-57A **Task Force Recommendation Category:** 1

POTENTIAL WATERFOWL NESTING COVER ENHANCEMENT AND MAINTENANCE AT THE THERMALITO AFTERBAY

Date of Field Evaluation: February 2002 to present

Field Evaluation Team: Dave Bogener, Amy Brinkhaus, Don Anthrop, Byron Stone, Andy Atkinson

Proposed PM&E:
This PM&E involves annual development and maintenance of waterfowl nesting cover at the Thermalito Afterbay.

Background:
The Thermalito Afterbay receives significant waterfowl use year-round. Both marginal wetlands and adjacent upland cover are utilized by mallards for nesting cover. Nesting mallards require dense, green, tall, vegetation for nesting within 3/4 miles of brood water. These characteristics are generally lacking within the upland habitats surrounding the Afterbay. However, low nest densities do occur within these upland habitats (0.16 nests/acre). Lack of adequate cover within upland habitats leads to increased predation rates of mallard nests (Anthrop pers. comm.). Suitable nesting habitat characteristics are present within the 900 acre wetland margin of the Afterbay. Higher nest densities are present within this habitat (0.28 nests/acre). However, waterfowl nests within the Afterbay wetland margin are subject to inundation due to project operations.

The California Department of Water Resources (DWR), California Department of Fish and Game (DFG), California Waterfowl Association (CWA) and other stakeholders have worked cooperatively to enhance waterfowl production at the Afterbay over the last 15 years. Extensive experimentation, habitat improvement and monitoring have occurred. Data analyses indicate that upland cover enhancement involving disking, seeding, and fertilization

- Can increase waterfowl nesting densities to about 10 nests/acre
- May reduce nest predation
- Can maintain adequate cover for 3 to 4 years with annual fertilization
- Can in combination with spring water level control, reduce or eliminate nest losses along the wetland margin
- Cost about $140-$160/acre for initial planting and $28-$30/acre for subsequent fertilization

Potential Environmental Benefits:
Waterfowl nesting cover enhancement can increase nesting densities to up to 10 nests/acre and reduce nest losses due to project operation if developed in coordination with water level control of the Afterbay during the nesting season (March 15 through May 15). Further, these waterfowl nesting cover enhancements may serve to reduce predation.

Waterfowl nest cover plots provide cover and/or forage for a variety of wildlife species including reptiles, amphibians, small mammals, and other species of birds. Several special status species forage or nest within these cover enhancements including northern harrier, black-shoulder kite, short-eared owl, American bittern, prairie falcon, and Cooper's hawk. The waterfowl nest enhancements provide both plant species and structural diversity to the upland habitats, increasing habitat diversity and ultimately wildlife species diversity.

Conditions in the Proposed PM&E Implementation Area:
The areas most suitable for waterfowl nesting cover enhancement are those upland areas around the Afterbay where food or nest cover plantings have occurred historically as they generally meet all of the design considerations listed below.

Conditions in these areas where food and cover plantings have historically occurred are slightly different than adjacent undisturbed areas. These areas tend to be in more upland situations where seasonal equipment access is possible. Historic disking has resulted in a general leveling of the physical micro topography and improved drainage. Past disturbance (disking, planting, fertilization) related to food and cover enhancement has lead to reduced native plant species diversity in these areas. No special status plant species have been identified in the upland habitat around the Thermalito Afterbay. However, relicensing stakeholders have identified the need to maintain native plant species diversity within the upland plant community around the Afterbay.

The height and density of waterfowl nesting cover is strongly correlated with spring precipitation and fertilization. Low precipitation during February, March, and April are unlikely produce the same level of nesting density as above normal precipitation in these months.

Design Considerations and Evaluations:
- Avoidance of sensitive resources including wetlands, vernal pools, and swales
- Avoidance of high recreation use areas
- Dry enough for fall/winter equipment use during disking and planting
- Soil suitability
- Site accessibility
- Proximity to adequate brooding habitat

- Greater nest densities documented on hill or slope as compared with level ground
- Minimize impact to previously undisturbed upland habitats which harbor higher densities of upland native plant species
- Minimize impacts to current or future land use, operations, or maintenance

Recommendations:
The feasibility of implementation of this PM&E should be evaluated by both the Environmental and Operations Work Groups to determine the merit of further investigation and development. Additional evaluation of the amount of area to be treated annually should occur.

Resource Action: EWG-68A **Task Force Recommendation Category:** 1

POTENTIAL RE-OPERATION OF THE THERMALITO AFTERBAY WATER SURFACE ELEVATION TO RECHARGE WATERFOWL BROOD PONDS

Date of Field Evaluation: February 2002 to present

Field Evaluation Team: Dave Bogener, Curtis Anderson, Jim West

Proposed PM&E:
This PM&E involves re-operation of the Thermalito Afterbay to insure that waterfowl brood ponds remain functional by retaining sufficient water throughout the primary waterfowl brooding season.

Background:
Since construction, about 900 acres of wetland margin have developed around the Afterbay margin. Waterfowl are attracted to this habitat and substantial waterfowl nesting (primarily mallard) currently occurs along the wetland margin and in associated upland habitats.

Physical topography of the Thermalito Afterbay is such than even relatively minor decreases in water surface elevation can result in extensive areas of exposed open mudflats along the northern and eastern edges. These mudflats contain little of no cover. Further, as the Afterbay's drawndown continues the distance from open water to cover increases. Under these exposed conditions waterfowl broods are subject to high predation rates.

The Department of Water Resources, California Department of Fish and Game, California Waterfowl Association, and other stakeholders have worked cooperatively over the last 15 years to increase waterfowl production on the Afterbay. One cooperative program to address the reduced cover associated with Afterbay operations involved construction of six waterfowl brood ponds. These ponds were constructed by creating a small levee or dam across an inlet of the Afterbay. These impoundments maintain a relatively stable water surface elevation which allows the establishment of emergent vegetation as well as submerged aquatic habitat. Further, these impoundments create conditions where the open water and terrestrial cover habitats are immediately adjacent. These brood ponds are believed to have significantly reduced waterfowl brood mortality. However, water losses to evapotranspiration, groundwater recharge, and evaporation serve over time to reduce the water level in these impoundments.

Five of the six existing waterfowl brood ponds were designed to be recharged at Afterbay water surface elevations of 134.1 feet or higher. One brood pond was engineered at an elevation which precludes recharge via the Afterbay. However, DFG

can pump water into this pond if the Afterbay water surface elevation reaches 134.1 feet. Under an informal agreement with the stakeholders, DWR has traditionally attempted to recharge these brood ponds at regular intervals throughout the primary brooding season (May 1st through July 31st). Field observations during the course of relicensing indicate that recharge of brood ponds at three week intervals during the waterfowl brooding season will provide adequate water to maintain the functionality of the ponds.

Potential Environmental Benefits:
Although the waterfowl brood ponds were constructed to reduce brooding waterfowl losses and increase production, they provide improved habitat conditions for a variety of terrestrial and aquatic species including special status species. A few of the special status species which have been observed on or near these brood ponds include bald eagle, osprey, black tern, American bittern, American white pelican, white-faced ibis, black-crowned night heron, double-crested cormorant, long-billed curlew, and short-eared owl. Further, these ponds also provide potentially suitable habitat for giant garter snake and red-legged frog.

Conditions in the Proposed PM&E Implementation Area:
This PM&E will not significantly alter existing conditions. Rather, this PM&E will formalize at stakeholders request, existing informal agreements and provide guidance to DWR Operations staff on the water surface elevation required to recharge the ponds, when the primary waterfowl brooding season occurs, and frequency and timing of recharge.

Design Considerations and Evaluations:

- Re-operate Thermalito Afterbay to insure that the surface water elevation reaches 134.1 or higher at approximately three week intervals between May 1st and July 31st.
- Observations indicate that the water surface elevation should remain at or above 134.1 for a period of 12 hours to allow complete recharge of the largest pond over the relatively narrow spillway.
- Coordinate recharge events with DFG Oroville Wildlife staff. This will allow DFG to provide pump recharge into brood pond #4.
- DWR Operations will evaluate this potential PM&E and identify impacts including costs in water or power, operation flexibility, or other criteria.
- Periodic monitoring will be required to fine tune operational criteria for recharge events.

Recommendations:
The feasibility of implementation of this PM&E should be evaluated by both the Environmental and Operations Work Groups to determine the merit of further investigation, development, and implementation.